

# SONY®

## White paper

May 2013



## Xperia™ ZR

C5503

Note: Screen images are simulated.

# Purpose of this document

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Sony product White papers are intended to give an overview of a product and provide details in relevant areas of technology.

## Document history

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Version		
May 2013	Fifth released version	Version 5

## Sony Mobile Developer World

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For the latest technical documentation and development tools, go to [www.sonymobile.com/developer](http://www.sonymobile.com/developer).

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# Product overview

## Xperia™ ZR highlights

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- Waterproof\*, dust and scratch resistant (IP55 / IP58)
- 4.6-inch HD Reality Display with Mobile BRAVIA® Engine 2
- 13.1MP fast capture camera with Exmor RS™ and HDR
- Snapdragon™ S4 Pro quad-core 1.5 Ghz processor with 2GB RAM and One-touch mirroring
- Battery STAMINA Mode for better battery life

### Bring it everywhere

Xperia™ ZR is the new waterproof\* smart phone from Sony. So you can film in HD and take photos under water, capturing sharp visuals in any conditions. It's also dust and scratch resistant. Bring it to the pool. Drop it in the goldfish bowl. Take it out in the rain. Get it dusty. The Xperia™ ZR is precision crafted to handle whatever you throw at it.

### Bright and sharp HD screen

The sharp 4.6-inch HD Reality Display powered by Mobile BRAVIA® Engine 2 features the same contrast enhancement technology as used in Sony TVs, so you really feel like you're there. And when the Xperia™ ZR is turned off, the OptiContrast™ panel makes the entire front seamlessly, solemnly black.

### Picture perfection

The Xperia™ ZR's 13.1-megapixel fast-capture camera goes from sleep to snap in just over a second. The device handles low light too, thanks to the highly sensitive Exmor RS™ for mobile BSI sensor. And with HDR, pictures and videos that you shoot in strong backlit conditions still come out great.

### High speed

The Xperia™ ZR has the latest-generation Snapdragon™ S4 Pro quad-core 1.5 Ghz processor. In short, it's fast. Move seamlessly between apps, movies, music and more. The processor is asynchronous too – the four cores work separately but don't use more battery power than they need to.

### Share your phone screen on a TV

You can use the Screen Mirroring\*\* feature to wirelessly share content from your phone via a TV. With the touch of a button, you can, for example, watch a selected photo pop up on the TV screen or listen to the current music track (from your phone's music player) play on the TV's speakers.

### Better battery life

With Battery STAMINA Mode you have more intelligent battery management and can easily improve your standby time by four times or more. When the screen is off, your phone automatically shuts down the battery-draining apps you don't need, then starts them up again when the screen is back on. You can also choose which apps to keep running even when the screen is off.

\* In compliance with IP55 and IP58, Xperia™ ZR is protected against the ingress of dust and is waterproof. Provided that all ports and covers are firmly closed, the phone is (i) protected against low pressure jets of water from all practicable directions in compliance with IP55; and/or (ii) can be kept under 1.50 metres of freshwater for up to 30 minutes in compliance with IP58. For more information, go to [www.sonymobile.com/testresults](http://www.sonymobile.com/testresults)

\*\* Your TV must support screen mirroring based on Wi-Fi CERTIFIED Miracast™ for the screen mirroring feature to work. If your TV does not support such screen mirroring, you need to purchase a wireless display adapter separately. When using screen mirroring, the image quality may sometimes be negatively impacted if there is interference from other Wi-Fi networks.



## Facts – dimensions, weight, performance and networks

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Operating system	Google™ Android™ 4.1 (Jelly Bean)
Processor	1.5 GHz Qualcomm APQ8064 + MDM9215M Quad Core
GPU	Adreno 320
Size	131.3 x 67.3 x 10.5 mm
Weight	138 grams
Available colours	Black, White, Pink, Mint
SIM card	Micro SIM
Main screen	
Colours	16,777,216 colour TFT
Resolution	1280x720 pixels
Size (diagonal)	4.55 inches
Scratch-resistant	Shatter proof sheet on scratch-resistant glass
Input mechanisms	
Text input	On-screen QWERTY keyboard
Touch screen	Capacitive
Touch gesture	Yes – multi-touch, up to 10 fingers supported
Memory	
RAM	2 GB
Flash memory	Up to 8 GB*
Expansion slot	microSD™ card, up to 32 GB
Camera	
Camera resolution	13.1 MP
Digital zoom	16x
Photo light	Yes – Pulsed LED
Video recording	Yes – HD 1080p
Front Camera	Yes – VGA
Sensors	
Accelerometer	Yes
Proximity sensor	Yes
Ambient light sensor	Yes

Magnetometer	Yes
Gyroscope	Yes
Networks	
C5503	UMTS HSPA+ 850 (Band V), 900 (Band VIII), 2100 (Band I) MHz GSM GPRS/EDGE 850, 900, 1800, 1900 MHz LTE (Bands 1, 3, 5, 7, 8, 20)
Data transfer speeds	
GSM GPRS	Up to 107 kbps
GSM EDGE	Up to 296 kbps
UMTS HSPA cat 6 (upload)	Up to 5.8 Mbps
UMTS HSPA+ cat 24 (download)	Up to 42 Mbps
LTE cat 3 (upload)	Up to 50 Mbps
LTE cat 3 (download)	up to 100 Mbps
Talk time (GSM)	Up to 11 hours**
Standby time (GSM)	Up to 470 hours**
Talk time (UMTS)	Up to 13 hours**
Standby time (UMTS)	Up to 520 hours**
Standby time (LTE)	Up to 450 hours**
Music listening time	Up to 45 hours**
Video playback time	Up to 8.5 hours**
Battery (Removable)	2300 mAh minimum




\* Memory comprises of approximately of 3.4 GB firmware, plus 4.6 GB of “Internal storage” for downloaded applications, music, pictures and movies, and some application data. For more details about memory, see “Memory in Android™ devices” on page 17.

\*\* Values are according to GSM Association Battery Life Measurement Technique as performed in controlled laboratory conditions. Actual time may vary.







NOTE: Battery performance may vary depending on network conditions and configurations, and device usage.

NOTE: All performance metrics are measured under laboratory conditions.

## Categorised feature list

 <p><b>Camera</b></p> <ul style="list-style-type: none"> <li>13.1 megapixel camera</li> <li>16x digital zoom</li> <li>Auto focus</li> <li>Burst Mode</li> <li>HDR for photos and videos</li> <li>Face detection</li> <li>Face recognition</li> <li>Flash/Pulsed LED</li> <li>Flash/Photo light</li> <li>Front-facing camera (VGA)</li> <li>Geotagging</li> <li>HD video recording (1080p)</li> <li>Image stabiliser</li> <li>Object tracking</li> <li>Picture Effect</li> <li>Quick Launch</li> <li>Red-eye reduction</li> <li>Scene recognition</li> <li>Self-timer</li> <li>Send to web</li> <li>Smile shutter™</li> <li>Sony Exmor RS® for mobile</li> <li>Image sensor</li> <li>Superior Auto</li> <li>Sweep Panorama</li> <li>Touch capture</li> <li>Touch focus</li> <li>White balance</li> </ul>	 <p><b>Music</b></p> <ul style="list-style-type: none"> <li>3D Surround Sound (VPT)</li> <li>Album art</li> <li>Bluetooth™ stereo (A2DP)</li> <li>ClearAudio+</li> <li>Clear Bass</li> <li>Clear Phase™</li> <li>Clear stereo</li> <li>Dynamic normaliser</li> <li>Music tones (MP3/AAC)</li> <li>PlayNow™ service*</li> <li>SensMe™</li> <li>TrackID™ music recognition*</li> <li>“WALKMAN” application</li> <li>xLoud™ Experience</li> </ul>	 <p><b>Internet</b></p> <ul style="list-style-type: none"> <li>Bookmarks</li> <li>Google Chrome™</li> <li>Google Play™</li> <li>Google™ search*</li> <li>Google Voice™ Search*</li> <li>Google Maps™ for Mobile with Street view and Latitude™*</li> <li>Google Wallet™</li> <li>NeoReader™ barcode scanner*</li> <li>Pan &amp; zoom</li> </ul>
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 <p><b>Communication</b></p> <ul style="list-style-type: none"> <li>Call list</li> <li>Facebook™ application*</li> <li>Google Talk™ application*</li> <li>Noise suppression</li> <li>Polyphonic ringtones</li> <li>Xperia™ Socialife*</li> <li>Speakerphone</li> <li>Twitter™*</li> </ul>	 <p><b>Messaging</b></p> <ul style="list-style-type: none"> <li>Conversations</li> <li>Email</li> <li>Google Mail™*</li> <li>Handwriting recognition</li> <li>Instant messaging</li> <li>Multimedia messaging (MMS)</li> <li>Predictive text input</li> <li>Sound recorder</li> <li>Text messaging (SMS)</li> <li>Voice input</li> </ul>	 <p><b>Design</b></p> <ul style="list-style-type: none"> <li>Auto rotation</li> <li>Battery STAMINA Mode</li> <li>Direct touch</li> <li>Face Unlock</li> <li>Front illumination</li> <li>Gesture input</li> <li>IPX5 and IPX8 (Water-proof)**</li> <li>IP5X (Dust-proof)</li> <li>On-screen QWERTY keyboard</li> <li>Sony Mobile BRAVIA® Engine 2</li> <li>Screenshot capturing</li> <li>Throw</li> <li>Touch screen</li> <li>Wallpaper</li> <li>Wide color gamut</li> </ul>
 <p><b>Entertainment</b></p> <ul style="list-style-type: none"> <li>3D games</li> <li>Album apps</li> <li>Media browser</li> <li>Motion gaming</li> <li>Movies apps</li> <li>PlayStation® Certified</li> <li>Radio (FM radio with RDS)</li> <li>SensMe™ slideshow</li> <li>Sony Entertainment Network*</li> <li>TV launcher</li> <li>Video streaming</li> <li>YouTube™*</li> </ul>	 <p><b>Organiser</b></p> <ul style="list-style-type: none"> <li>Airplane mode</li> <li>Alarm clock</li> <li>Calculator</li> <li>Calendar</li> <li>Contacts</li> <li>Document readers</li> <li>eCompass™</li> <li>Infinite button</li> <li>Notes</li> <li>Setup guide</li> <li>Stopwatch</li> <li>Tasks</li> <li>Timer</li> </ul>	 <p><b>Connectivity</b></p> <ul style="list-style-type: none"> <li>3.5 mm audio jack (CTIA)</li> <li>aGPS*</li> <li>Bluetooth™ 4.0 wireless technology</li> <li>DLNA Certified®</li> <li>GLONASS</li> <li>HDMI via MHL support</li> <li>Media Go™</li> <li>Media Transfer Protocol support</li> <li>Micro USB support</li> <li>Native USB tethering</li> <li>NFC</li> <li>PC Companion</li> <li>Screen mirroring</li> <li>Synchronisation via Exchange</li> <li>ActiveSync®</li> <li>Synchronisation via Facebook™</li> <li>Synchronisation via Google™</li> <li>Synchronisation via SyncML™</li> <li>USB charging</li> <li>USB High speed 2.0 support</li> <li>Xperia Link™</li> <li>Wi-Fi®</li> <li>Wi-Fi® Hotspot functionality</li> </ul>

\* This service is not available in all markets.

*\*\* In compliance with IP55 and IP58, Xperia™ ZR is protected against the ingress of dust and is waterproof. Provided that all ports and covers are firmly closed, the phone is (i) protected against low pressure jets of water from all practicable directions in compliance with IP 55; and/or (ii) can be kept under 1.50 metres of freshwater for up to 30 minutes in compliance with IP58. The phone is not designed to float or work submerged underwater outside the IP55 or IP58 classification range that may lead to your warranty will being void. Find out more [www.sonymobile.com/testresults](http://www.sonymobile.com/testresults)*

# Technologies in detail

NOTE: The information outlined below is general, and levels of compliance to standards and specifications may vary between products and markets. For more information, contact Sony Mobile Developer World or your Sony contact person where applicable.

## Device-to-device communications (local)

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### Bluetooth™ wireless technology

Bluetooth™ profiles supported	Advanced Audio Distribution Profile v1.2 Audio/Video Remote Control Profile v1.3 Handsfree Profile v1.6 (Wide band speech) Headset Profile v1.2 Object Push Profile v1.1 Phonebook Access Profile v1.1 Message Access Profile v1.0 Health Device Profile 1.1 Generic Attribute Profile Client/Server over LE Proximity Monitor Profile over LE v1.0 Serial Port Profile v1.1 Device Identification Profile v1.3 Human Interface Device Profile v1.1 Personal Area Networking Profile v1.0
Core version and supported core features	Version 4.0
Connectable devices	Products supporting at least one of the Bluetooth™ profiles. BT4.0 accessories generally require installation of a supporting application.

More information:

[www.sonymobile.com/developer](http://www.sonymobile.com/developer)

[www.bluetooth.com](http://www.bluetooth.com)

**Wi-Fi®**

Supported standards	IEEE 802.11a/b/g/n and Wi-Fi® Wi-Fi Direct® and Wi-Fi Protected Setup
Connectable devices	Wi-Fi® access points Wi-Fi Direct® compatible devices
Frequency band	2.4 GHz/5 GHz
Data transfer rate	Up to 150 Mbit/s
Security	WEP Open Authentication WEP Shared Authentication WPA Personal and WPA2 Personal WPA Enterprise and WPA2 Enterprise EAP-SIM EAP-AKA EAP-TLS EAP-TTLS/MSCHAPv2 PEAPv0/EAP-MSCHAPv2 PEAPv1/EAP-GTC
Encryption	WEP 64 bit, WEP 128 bit, TKIP and CCMP (AES)
Power save	WMM-UAPSD
QoS	WMM

## DLNA Certified® (Digital Living Network Alliance)

Supported Device Classes	<p>M-DMS – Mobile Digital Media Server Media Types: images, music and video Summary: The digital media server exposes the media files in your device to a Wi-Fi® network. The files can then be accessed from other DLNA Certified® clients. +PU+</p> <p>Media Types: image, video and music Summary: Play media from your device on another device, such as a TV or computer, using 2 box push technology. +PU+ is integrated in the Album, Movies and Walkman applications.</p> <p>M-DMP – Mobile Digital Media Player Media Types: image, video and music Summary: Play content stored on another device, for example, a server or a PC, directly on your device. +DN+</p> <p>Media Types: video and music Summary: Download content stored on another device, for example, a server or a PC, and play the downloaded content directly on your device.</p>
Supported Bearers	Wi-Fi®
DRM Support	The DLNA Certified® implementation does not support DRM-protected content.

## Messaging

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### MMS (Multimedia Messaging Service)

According to OMA Multimedia Messaging Service v1.0 + SMIL

### Email

Bearer type (IP)	GPRS, EGPRS, UMTS
Character sets	BIG5 Traditional Chinese GB18030 ISO-2022-JP Japanese ISO-8859-1 ISO-8859-2 Eastern Europe ISO-8859-5 Cyrillic ISO-8859-7 Greek ISO-8859-9 Turkish ISO 8859-11 KOI8-R Cyrillic Shift_JIS Japanese USASCII UTF-16 UTF-8 Windows® 874 Windows® 1251 Cyrillic Windows® 1252 Windows® 1254 Turkish Windows® 1258 Vietnamese
Protocols	POP3 and IMAP4
Push email	Microsoft® Exchange ActiveSync® (EAS)
Secure email	SSL/TLS, both port methods (POPS/IMAPS) and START-TLS
HTML mail	Yes (read only)

More information:

[www.sonymobile.com/developer](http://www.sonymobile.com/developer)

[www.openmobilealliance.org](http://www.openmobilealliance.org)

## Positioning – location based services

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Supported standards:

- OMA Secure User Plane Location (SUPL) v1.0 and v2.0
- 3GPP™ Control Plane location (incl. Emergency location)
- Qualcomm® GPSOneExtra™

Supported satellite systems:

- GPS
- GLONASS\*

\* NOTE: GPS and GLONASS are used together to calculate the position. Positioning is more robust and accurate in most conditions if both systems are active. The benefits of using GLONASS are automatically available for all applications using the Satellite Positioning API (referred to as "GPS Provider" in Android terminology).

## Provisioning (OMA CP)

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OMA CP version 1.1

## Multimedia (audio, image and video)

Audio Playback	Decoder format	Supported in file format
	MP3	MP3 (.mp3), AVI (.avi, .xvid)
	AAC LC, HE-AAC v1, HE-AAC v2, AAC ELD	3GPP (.3gp), MP4 (.mp4, .m4a), MKV (.mkv)
	AMR-NB, AMR-WB	3GPP (.3gp)
	General MIDI (GM)	SMF (.mid)
	Linear PCM, PCM/WAVE 8- and 16-bit	WAV (.wav), AVI (.avi), MKV (.mkv)
	Ogg vorbis	Ogg vorbis (.ogg)
	FLAC	FLAC (.flac)
Audio Recording	Encoder format	Supported in file format
	AMR-NB, AMR-WB	3GPP (.3gp), MP4 (.mp4, .m4a), AMR (.amr)
	AAC-LC	3GPP (.3gp), MP4 (.mp4, .m4a)
Image Playback	Decoder format	Supported in file format
	1, 4, 8, 16, 24 and 32 bpp and RLE encoded formats	BMP (.bmp)
	Single and multi-frame, bitmap mask support (GIF87a format and GIF89a format)	GIF (.gif)
	JPEG	JPEG (.jpg)
	PNG	PNG (.png)
Image Capture	Encoder format	Supported in file format
	JPEG	JPEG (.jpg)
Video Playback	Decoder format	Supported in file format
	MPEG-4 1080p (1920x1080) Advanced Simple Profile Level 5 20 Mbps at 30 fps	3GPP (.3gp), MP4 (.mp4, .m4a), Matroska (.mkv), AVI (.avi, .xvid)
	H.264 1080p (1920x1080) High Profile level 4 20 Mbps at 30 fps	3GPP (.3gp), MP4 (.mp4, .m4a) Matroska (.mkv), MPEG2-TS (.ts, AAC audio)
	H.263 Profile 0 Level 70	3GPP (.3gp), MPEG-4 (.mp4, .m4a)
	VP8	WebM (.webm), Matroska (.mkv)



Video Recording	Encoder format	Supported in file format
	Video: H.263 Profile 0, H.264 1080p (1920x1080) High Profile  Audio: AAC-LC stereo, AMR-NB	3GPP (.3gp), MP4 (.mp4, .m4a)
Audio/Video Streaming	Streaming transport	RTSP, HTTP / HTTPS, HLS
DRM	DRM (Digital Rights Management) – features the rights and copy protection of downloaded content	OMA DRM 1.0 Marlin DRM

## Synchronisation (OMA DS, EAS, Google Sync™)

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OMA Data Synchronisation protocol versions 1.1.2 and 1.2

OMA Data Formats: vCard 2.1, vCalendar 1.0

Microsoft® Exchange ActiveSync® protocol version 2.5

Microsoft® Exchange ActiveSync® protocol version 12

Microsoft® Exchange ActiveSync® protocol version 12.1

Microsoft® Exchange ActiveSync® protocol version 14

Microsoft® Exchange ActiveSync® protocol version 14.1

Google Sync™

Related information:

[www.sonymobile.com/developer](http://www.sonymobile.com/developer)

## Web browser

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Google Chrome™ for Android™ is pre-installed.\*

Related information:

<https://play.google.com/store/apps/details?id=com.android.chrome>

\* Google Chrome™ is not available for all markets.

## Memory in Android™ devices

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To use Android devices efficiently, users should be aware of the different types of device memory. This knowledge is important in order to understand, for example, where music, photos and videos are saved; how many apps can be downloaded from Android Market; and how photos can be copied to a PC.

The below information is also of interest to developers who want to optimise their programs to make the best possible use of the resources in the device.

Generally, all Android devices share the same basic memory setup. What differs is how much memory is available to you via the different types of memory, and whether your device uses an external SD card or an internal memory chip. Any information specific to the particular device model described in this White Paper is noted as such.

### Types of memory

The types of memory described and numbered below are consistent with the terminology used in Sony mobile device menus and in other content relating to 2013 Xperia™ devices:

1. Dynamic Memory (also known as RAM) is used by applications that run when the device is turned on. The amount of Dynamic Memory influences how many applications and operating system services can run at the same time. The Android operating system automatically closes applications and services that are not being used.

However, such automatic functionality has limits. For example, if a lower amount of free RAM is available to applications after a new release of the operating system (due to increased capabilities in the system), device speed will eventually be impacted. This is the main reason that a device cannot be indefinitely upgraded to newer releases of Android™.

If you experience problems with RAM, for example, if the device runs slower than usual or if the Home application restarts frequently when you leave an application, you should minimise the use of apps that run all the time. Such apps could include, for example, applications that frequently download social networking service updates. You could also consider using a static wallpaper instead of a live wallpaper.

To see which apps and services are currently active, go to Settings > Applications > Running Services. You should have at least 50 MB, and ideally 100 MB or more, of free RAM to avoid slowdowns and application restarts.

You should also be aware that if you update the device to a later Android release, the load on the built-in Dynamic Memory will increase due to the addition of more features, as mentioned above. As a result, the device may run slower after an update.

The Xperia™ ZR has about 2 GB of RAM available to the Android OS and applications, of which about 200 MB is already used out of the box.

2. System Memory (also known as “System partition” or “/system”) is used for the Android OS and for most applications that are pre-loaded from the factory. This type of memory is normally locked, and can only be changed through a firmware upgrade. There is usually some free space available in this section of memory. However, since it is locked, you cannot save apps, photos or any other content to this memory. System Memory is reserved for future firmware upgrades, which almost always need more memory than the original firmware. You cannot see or influence the use of this memory.
3. Internal Storage is memory used as “working” memory. It can be compared to the C: drive on a PC or to the startup disk on a Mac.

This type of memory is used to store all application downloaded from the Google Play™ Store (and other sources) as well as their settings and data (such as emails, messages and calendar events, for example). All applications have an allocated area which no other applications can access and where the application data can be stored.

Some game applications also store content such as game music and game level information outside their own designated area. In most cases, an application can choose to save its data in a location of its own choosing (outside the protected application settings area). Generally, such content is not deleted when an application is uninstalled; it must be removed manually by connecting the device to a computer with a USB cable, or by using a file manager application.

Internal Storage is also used for all user content added, for example, as a result of the user taking photos with the camera, downloading media files, and performing file transfers. Typical user content includes:

- photos
- movies
- music
- downloaded documents (as email attachments, for example)

Internal Storage will tend to fill up as a result of normal usage. Examples of such usage are the saving of data by applications; the downloading and installation of new applications; the downloading of free or paid content; and the shooting of pictures and movies. Therefore, the larger this memory is from the start, the more applications you can download and use, and the more pictures and movies you can shoot.

If the Internal Storage starts to get full, the device slows down, and in some cases it might no longer be possible to install more apps. You should always ensure that you have at least 100 MB of free Internal Storage. If not, you should consider removing some apps that you seldom use, or move content that you do not frequently access to safe storage.

You can see approximately how much Internal Storage is free under Settings > Storage > Internal Storage. You can also view more detail about how much memory is used by various applications under Settings > Applications > Manage Applications. In the Xperia™ ZR, about 4.6 GB of Internal Storage is available out of the box.

Please note that in Sony Mobile 2013 products, “Internal Storage” is now the combination of what was previously known as “Device Memory” (for applications and their data – also previously known as “/data”) and “Internal Storage” (for user’s content – also previously known as “/sdcard”). The reason for this change is to make the use of available memory more flexible, and also to enable the optional encryption of user’s content.

#### Memory card slot

In some products you may find both a large internal memory and a memory card reader slot. However, on the current Android platform, the card reader slot does not work in the same manner in a device with a large internal memory as it does in a device with ONLY a memory card slot.

Generally, since most applications expect only a single location for storage, such applications will not generally allow you to SAVE anything to the memory card (i.e., they do not offer the option to choose a storage location). However, some applications (for instance, the Sony Mobile “Camera” application) may actually allow you to do so. Other applications, for example, backup applications such as the Sony Mobile “Memory” application, will by definition be configured to copy content from the Internal Storage to the external SD card.

On the other hand, when it comes to reading from an external SD Card, you will be able to access content (for example, videos, photos and music) on a memory card inserted in this slot without any special consideration since the Android system searches all available memory for content. Therefore, such products may be regarded as supporting a fourth type of memory, called “External Card” or “SD Card”.

4. SD Card (known as “/ext\_card” from a programmer’s point of view, or by other names in other Android products) is the name for the removable SD memory card in all 2013 Sony Mobile products. As described above, this External Card memory is generally more limited in that any application can read from it, but many applications cannot save to this card. Only a few applications, including backup applications and file manager applications, have the capability to save to this card.

#### Backing up data to different memory types

Generally, you should not save photos, videos and other personal content solely on the internal memory of a device. If something should happen with the hardware, or if the device is lost or stolen, the data stored on the device’s internal memory is gone forever.

In a device where an SD card reader is the main memory, it is relatively easy to take the card out and copy all content to a PC or Mac, or to an entertainment device with a memory card slot. In a product featuring Internal Storage as the main memory, it is not possible to physically remove the memory. Instead, any critical or high-value content must either be copied to an external SD card by a special backup application, transferred to remote storage over a network (mobile or Wi-Fi), or to a computer via a USB cable.

To facilitate the transfer of data via a cable, the Xperia™ ZR supports the Microsoft standard, Media Transfer Protocol (MTP), which makes it possible to easily transfer content back and forth between your device and a Windows PC. For Apple Mac computers, a special application called Bridge for Mac is available with built-in support for MTP. This application can be downloaded from the Xperia™ ZR Support page.

Note that you do not need to back up or make a copy of applications that you have downloaded from the Google Play™ Store. They can normally be downloaded again after you have set up your Google account to work in a new device (or in a device where the memory has been completely erased).

#### Note 1:

As noted above, some Android devices, including Sony Mobile devices from 2012 and Sony Ericsson devices from 2011 and earlier, do not use a single “Internal Storage” for both applications (and their data) and user content. Instead, these devices use either an external SD card for user content, or a corresponding area of internal memory to reproduce the functionality of an SD card. In such devices, there is a fixed limit between the application area (“/data”) and the user content area (“/sdcard”), with the result that user content can build up and reach this limit. The consequence of such a limit being reached, for example, for the camera application, would be that no new pictures could be taken even if there was still a considerable amount of free space in the application area (or in the user content area). In such an instance, the download and installation of new applications would also not be possible, even if there was enough free memory in the content area.

#### Note 2:

Some devices with integrated storage have abandoned the distinction between the application area and the content area when it comes to a Factory Data Reset. As a result, there is no option in such devices to perform a Factory Data Reset and preserve content. In such devices, all content is mandatorily and completely deleted from the device when a reset is performed.

In contrast, Sony Mobile’s memory integration solution makes it possible to preserve user content in this situation. Therefore, when performing a Factory Data Reset, the default action will still be to only remove applications and their data, and an option box must be checked if all content is to be removed as well (as might be desirable when selling the device second-hand, for instance).

**Note 3:**

For a developer, it is important to note that from a programming point of view the location names used to refer to the different memory areas described in Note 1 are still valid, i.e., the area used for applications (“/data”) is still present, as is the area used for content (“/sdcard”).

In reality, “sdcard” is a so-called “symbolic link” to “/data/media”. However, from inside an Android application, “/sdcard” can still be used. For example, you can use “sdcard/DCIM/100Android” to find all camera images. The continued use of “/sdcard” to access the content area ensures compatibility across different products and Android releases in this regard.

## Trademarks and acknowledgements

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Visit [www.sonymobile.com](http://www.sonymobile.com) for more information.

# SONY®

## White paper

May 2013



Xperia™ ZR  
C5502

Note: Screen images are simulated.



# Purpose of this document

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Sony product White papers are intended to give an overview of a product and provide details in relevant areas of technology.

## Document history

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Version		
May 2013	Fifth released version	Version 5

## Sony Mobile Developer World

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For the latest technical documentation and development tools, go to [www.sonymobile.com/developer](http://www.sonymobile.com/developer).

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[www.sonymobile.com](http://www.sonymobile.com)

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# Product overview

## Xperia™ ZR highlights

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- Waterproof\*, dust and scratch resistant (IP55 / IP58)
- 4.6-inch HD Reality Display with Mobile BRAVIA® Engine 2
- 13.1MP fast capture camera with Exmor RS™ and HDR
- Snapdragon™ S4 Pro quad-core 1.5 Ghz processor with 2GB RAM and One-touch mirroring
- Battery STAMINA Mode for better battery life

### Bring it everywhere

Xperia™ ZR is the new waterproof\* smartphone from Sony. So you can film in HD and take photos under water, capturing sharp visuals in any conditions. It's also dust and scratch resistant. Bring it to the pool. Drop it in the goldfish bowl. Take it out in the rain. Get it dusty. The Xperia™ ZR is precision crafted to handle whatever you throw at it.

### Bright and sharp HD screen

The sharp 4.6-inch HD Reality Display powered by Mobile BRAVIA® Engine 2 features the same contrast enhancement technology as used in Sony TVs, so you really feel like you're there. And when the Xperia™ ZR is turned off, the OptiContrast™ panel makes the entire front seamlessly, solemnly black.

### Picture perfection

The Xperia™ ZR's 13.1-megapixel fast-capture camera goes from sleep to snap in just over a second. The device handles low light too, thanks to the highly sensitive Exmor RS™ for mobile BSI sensor. And with HDR, pictures and videos that you shoot in strong backlit conditions still come out great.

### High speed

The Xperia™ ZR has the latest-generation Snapdragon™ S4 Pro quad-core 1.5 Ghz processor. In short, it's fast. Move seamlessly between apps, movies, music and more. The processor is asynchronous too – the four cores work separately but don't use more battery power than they need to.

### Share your phone screen on a TV

You can use the Screen Mirroring\*\* feature to wirelessly share content from your phone via a TV. With the touch of a button, you can, for example, watch a selected photo pop up on the TV screen or listen to the current music track (from your phone's music player) play on the TV's speakers.

### Better battery life

With Battery STAMINA Mode you have more intelligent battery management and can easily improve your standby time by four times or more. When the screen is off, your phone automatically shuts down the battery-draining apps you don't need, then starts them up again when the screen is back on. You can also choose which apps to keep running even when the screen is off.

\* In compliance with IP55 and IP58, Xperia™ ZR is protected against the ingress of dust and is waterproof. Provided that all ports and covers are firmly closed, the phone is (i) protected against low pressure jets of water from all practicable directions in compliance with IP55; and/or (ii) can be kept under 1.50 metres of freshwater for up to 30 minutes in compliance with IP58. For more information, go to [www.sonymobile.com/testresults](http://www.sonymobile.com/testresults)

\*\* Your TV must support screen mirroring based on Wi-Fi CERTIFIED Miracast™ for the screen mirroring feature to work. If your TV does not support such screen mirroring, you need to purchase a wireless display adapter separately. When using screen mirroring, the image quality may sometimes be negatively impacted if there is interference from other Wi-Fi networks.



## Facts – dimensions, weight, performance and networks

---

Operating system	Google™ Android™ 4.1 (Jelly Bean)
Processor	1.5 GHz Qualcomm APQ8064 + MDM9215M Quad Core
GPU	Adreno 320
Size	131.3 x 67.3 x 10.5 mm
Weight	138 grams
Available colours	Black, White, Pink, Mint
SIM card	Micro SIM
Main screen	
Colours	16,777,216 colour TFT
Resolution	1280x720 pixels
Size (diagonal)	4.55 inches
Scratch-resistant	Shatter proof sheet on scratch-resistant glass
Input mechanisms	
Text input	On-screen QWERTY keyboard
Touch screen	Capacitive
Touch gesture	Yes – multi-touch, up to 10 fingers supported
Memory	
RAM	2 GB
Flash memory	Up to 8 GB*
Expansion slot	microSD™ card, up to 32 GB
Camera	
Camera resolution	13.1 MP
Digital zoom	16x
Photo light	Yes – Pulsed LED
Video recording	Yes – HD 1080p
Front Camera	Yes – VGA
Sensors	
Accelerometer	Yes
Proximity sensor	Yes
Ambient light sensor	Yes

Magnetometer	Yes
Gyroscope	Yes
Networks	
C5502	UMTS HSPA+ 850 (Band V), 900 (Band VIII), 1700 (Band IV), 1900 (Band II), 2100 (Band I) MHz GSM GPRS/EDGE 850, 900, 1800, 1900 MHz
Data transfer speeds	
GSM GPRS	Up to 107 kbps
GSM EDGE	Up to 296 kbps
UMTS HSPA cat 6 (upload)	Up to 5.8 Mbps
UMTS HSPA+ cat 24 (download)	Up to 42 Mbps
Hearing Aid Compatibility (HAC)	
M-Rating	M3
T-Rating	T3
Talk time (GSM)	Up to 11 hours**
Standby time (GSM)	Up to 470 hours**
Talk time (UMTS)	Up to 13 hours**
Standby time (UMTS)	Up to 520 hours**
Music listening time	Up to 45 hours**
Video playback time	Up to 8.5 hours**
Battery (Removable)	2300 mAh minimum




\* Memory comprises of approximately of 3.4 GB firmware, plus 4.6 GB of “Internal storage” for downloaded applications, music, pictures and movies, and some application data. For more details about memory, see “Memory in Android™ devices” on page 17.







\*\* Values are according to GSM Association Battery Life Measurement Technique as performed in controlled laboratory conditions. Actual time may vary.

NOTE: Battery performance may vary depending on network conditions and configurations, and device usage.

NOTE: All performance metrics are measured under laboratory conditions.

## Categorised feature list

 <p><b>Camera</b></p> <ul style="list-style-type: none"> <li>13.1 megapixel camera</li> <li>16x digital zoom</li> <li>Auto focus</li> <li>Burst Mode</li> <li>HDR for photos and videos</li> <li>Face detection</li> <li>Face recognition</li> <li>Flash/Pulsed LED</li> <li>Flash/Photo light</li> <li>Front-facing camera (VGA)</li> <li>Geotagging</li> <li>HD video recording (1080p)</li> <li>Image stabiliser</li> <li>Object tracking</li> <li>Picture Effect</li> <li>Quick Launch</li> <li>Red-eye reduction</li> <li>Scene recognition</li> <li>Self-timer</li> <li>Send to web</li> <li>Smile shutter™</li> <li>Sony Exmor RS® for mobile</li> <li>Image sensor</li> <li>Superior Auto</li> <li>Sweep Panorama</li> <li>Touch capture</li> <li>Touch focus</li> <li>White balance</li> </ul>	 <p><b>Music</b></p> <ul style="list-style-type: none"> <li>3D Surround Sound (VPT)</li> <li>Album art</li> <li>Bluetooth™ stereo (A2DP)</li> <li>ClearAudio+</li> <li>Clear Bass</li> <li>Clear Phase™</li> <li>Clear stereo</li> <li>Dynamic normaliser</li> <li>Music tones (MP3/AAC)</li> <li>PlayNow™ service*</li> <li>SensMe™</li> <li>TrackID™ music recognition*</li> <li>“WALKMAN” application</li> <li>xLoud™ Experience</li> </ul>	 <p><b>Internet</b></p> <ul style="list-style-type: none"> <li>Bookmarks</li> <li>Google Chrome™</li> <li>Google Play™</li> <li>Google™ search*</li> <li>Google Voice™ Search*</li> <li>Google Maps™ for Mobile with Street view and Latitude™*</li> <li>Google Wallet™</li> <li>NeoReader™ barcode scanner*</li> <li>Pan &amp; zoom</li> </ul>
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 <p><b>Communication</b></p> <ul style="list-style-type: none"> <li>Call list</li> <li>Facebook™ application*</li> <li>Google Talk™ application*</li> <li>Noise suppression</li> <li>Polyphonic ringtones</li> <li>Xperia™ Socialife*</li> <li>Speakerphone</li> <li>Twitter™*</li> </ul>	 <p><b>Messaging</b></p> <ul style="list-style-type: none"> <li>Conversations</li> <li>Email</li> <li>Google Mail™*</li> <li>Handwriting recognition</li> <li>Instant messaging</li> <li>Multimedia messaging (MMS)</li> <li>Predictive text input</li> <li>Sound recorder</li> <li>Text messaging (SMS)</li> <li>Voice input</li> </ul>	 <p><b>Design</b></p> <ul style="list-style-type: none"> <li>Auto rotation</li> <li>Battery STAMINA Mode</li> <li>Direct touch</li> <li>Face Unlock</li> <li>Front illumination</li> <li>Gesture input</li> <li>IPX5 and IPX8 (Water-proof)**</li> <li>IP5X (Dust-proof)</li> <li>On-screen QWERTY keyboard</li> <li>Sony Mobile BRAVIA® Engine 2</li> <li>Screenshot capturing</li> <li>Throw</li> <li>Touch screen</li> <li>Wallpaper</li> <li>Wide color gamut</li> </ul>
 <p><b>Entertainment</b></p> <ul style="list-style-type: none"> <li>3D games</li> <li>Album apps</li> <li>Media browser</li> <li>Motion gaming</li> <li>Movies apps</li> <li>PlayStation® Certified</li> <li>Radio (FM radio with RDS)</li> <li>SensMe™ slideshow</li> <li>Sony Entertainment Network*</li> <li>TV launcher</li> <li>Video streaming</li> <li>YouTube™*</li> </ul>	 <p><b>Organiser</b></p> <ul style="list-style-type: none"> <li>Airplane mode</li> <li>Alarm clock</li> <li>Calculator</li> <li>Calendar</li> <li>Contacts</li> <li>Document readers</li> <li>eCompass™</li> <li>Infinite button</li> <li>Notes</li> <li>Setup guide</li> <li>Stopwatch</li> <li>Tasks</li> <li>Timer</li> </ul>	 <p><b>Connectivity</b></p> <ul style="list-style-type: none"> <li>3.5 mm audio jack (CTIA)</li> <li>aGPS*</li> <li>Bluetooth™ 4.0 wireless technology</li> <li>DLNA Certified®</li> <li>GLONASS</li> <li>HDMI via MHL support</li> <li>Media Go™</li> <li>Media Transfer Protocol support</li> <li>Micro USB support</li> <li>Native USB tethering</li> <li>NFC</li> <li>PC Companion</li> <li>Screen mirroring</li> <li>Synchronisation via Exchange</li> <li>ActiveSync®</li> <li>Synchronisation via Facebook™</li> <li>Synchronisation via Google™</li> <li>Synchronisation via SyncML™</li> <li>USB charging</li> <li>USB High speed 2.0 support</li> <li>Xperia Link™</li> <li>Wi-Fi®</li> <li>Wi-Fi® Hotspot functionality</li> </ul>

\* This service is not available in all markets.



*\*\* In compliance with IP55 and IP58, Xperia™ ZR is protected against the ingress of dust and is waterproof. Provided that all ports and covers are firmly closed, the phone is (i) protected against low pressure jets of water from all practicable directions in compliance with IP 55; and/or (ii) can be kept under 1.50 metres of freshwater for up to 30 minutes in compliance with IP58. The phone is not designed to float or work submerged underwater outside the IP55 or IP58 classification range that may lead to your warranty will being void. Find out more [www.sonymobile.com/testresults](http://www.sonymobile.com/testresults)*

# Technologies in detail

NOTE: The information outlined below is general, and levels of compliance to standards and specifications may vary between products and markets. For more information, contact Sony Mobile Developer World or your Sony contact person where applicable.

## Device-to-device communications (local)

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### Bluetooth™ wireless technology

Bluetooth™ profiles supported	Advanced Audio Distribution Profile v1.2 Audio/Video Remote Control Profile v1.3 Handsfree Profile v1.6 (Wide band speech) Headset Profile v1.2 Object Push Profile v1.1 Phonebook Access Profile v1.1 Message Access Profile v1.0 Health Device Profile 1.1 Generic Attribute Profile Client/Server over LE Proximity Monitor Profile over LE v1.0 Serial Port Profile v1.1 Device Identification Profile v1.3 Human Interface Device Profile v1.1 Personal Area Networking Profile v1.0
Core version and supported core features	Version 4.0
Connectable devices	Products supporting at least one of the Bluetooth™ profiles. BT4.0 accessories generally require installation of a supporting application.

More information:

[www.sonymobile.com/developer](http://www.sonymobile.com/developer)

[www.bluetooth.com](http://www.bluetooth.com)

**Wi-Fi®**

Supported standards	IEEE 802.11a/b/g/n and Wi-Fi® Wi-Fi Direct® and Wi-Fi Protected Setup
Connectable devices	Wi-Fi® access points Wi-Fi Direct® compatible devices
Frequency band	2.4 GHz/5 GHz
Data transfer rate	Up to 150 Mbit/s
Security	WEP Open Authentication WEP Shared Authentication WPA Personal and WPA2 Personal WPA Enterprise and WPA2 Enterprise EAP-SIM EAP-AKA EAP-TLS EAP-TTLS/MSCHAPv2 PEAPv0/EAP-MSCHAPv2 PEAPv1/EAP-GTC
Encryption	WEP 64 bit, WEP 128 bit, TKIP and CCMP (AES)
Power save	WMM-UAPSD
QoS	WMM

## DLNA Certified® (Digital Living Network Alliance)

Supported Device Classes	<p>M-DMS – Mobile Digital Media Server Media Types: images, music and video Summary: The digital media server exposes the media files in your device to a Wi-Fi® network. The files can then be accessed from other DLNA Certified® clients. +PU+</p> <p>Media Types: image, video and music Summary: Play media from your device on another device, such as a TV or computer, using 2 box push technology. +PU+ is integrated in the Album, Movies and Walkman applications.</p> <p>M-DMP – Mobile Digital Media Player Media Types: image, video and music Summary: Play content stored on another device, for example, a server or a PC, directly on your device. +DN+</p> <p>Media Types: video and music Summary: Download content stored on another device, for example, a server or a PC, and play the downloaded content directly on your device.</p>
Supported Bearers	Wi-Fi®
DRM Support	The DLNA Certified® implementation does not support DRM-protected content.

# Messaging

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## MMS (Multimedia Messaging Service)

According to OMA Multimedia Messaging Service v1.0 + SMIL

## Email

Bearer type (IP)	GPRS, EGPRS, UMTS
Character sets	BIG5 Traditional Chinese GB18030 ISO-2022-JP Japanese ISO-8859-1 ISO-8859-2 Eastern Europe ISO-8859-5 Cyrillic ISO-8859-7 Greek ISO-8859-9 Turkish ISO 8859-11 KOI8-R Cyrillic Shift_JIS Japanese USASCII UTF-16 UTF-8 Windows® 874 Windows® 1251 Cyrillic Windows® 1252 Windows® 1254 Turkish Windows® 1258 Vietnamese
Protocols	POP3 and IMAP4
Push email	Microsoft® Exchange ActiveSync® (EAS)
Secure email	SSL/TLS, both port methods (POPS/IMAPS) and START-TLS
HTML mail	Yes (read only)

More information:

[www.sonymobile.com/developer](http://www.sonymobile.com/developer)

[www.openmobilealliance.org](http://www.openmobilealliance.org)

## Positioning – location based services

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Supported standards:

- OMA Secure User Plane Location (SUPL) v1.0 and v2.0
- 3GPP™ Control Plane location (incl. Emergency location)
- Qualcomm® GPSOneExtra™

Supported satellite systems:

- GPS
- GLONASS\*

\* NOTE: GPS and GLONASS are used together to calculate the position. Positioning is more robust and accurate in most conditions if both systems are active. The benefits of using GLONASS are automatically available for all applications using the Satellite Positioning API (referred to as "GPS Provider" in Android terminology).

## Provisioning (OMA CP)

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OMA CP version 1.1

## Multimedia (audio, image and video)

Audio Playback	Decoder format	Supported in file format
	MP3	MP3 (.mp3), AVI (.avi, .xvid)
	AAC LC, HE-AAC v1, HE-AAC v2, AAC ELD	3GPP (.3gp), MP4 (.mp4, .m4a), MKV (.mkv)
	AMR-NB, AMR-WB	3GPP (.3gp)
	General MIDI (GM)	SMF (.mid)
	Linear PCM, PCM/WAVE 8- and 16-bit	WAV (.wav), AVI (.avi), MKV (.mkv)
	Ogg vorbis	Ogg vorbis (.ogg)
	FLAC	FLAC (.flac)
Audio Recording	Encoder format	Supported in file format
	AMR-NB, AMR-WB	3GPP (.3gp), MP4 (.mp4, .m4a), AMR (.amr)
	AAC-LC	3GPP (.3gp), MP4 (.mp4, .m4a)
Image Playback	Decoder format	Supported in file format
	1, 4, 8, 16, 24 and 32 bpp and RLE encoded formats	BMP (.bmp)
	Single and multi-frame, bitmap mask support (GIF87a format and GIF89a format)	GIF (.gif)
	JPEG	JPEG (.jpg)
	PNG	PNG (.png)
Image Capture	Encoder format	Supported in file format
	JPEG	JPEG (.jpg)
Video Playback	Decoder format	Supported in file format
	MPEG-4 1080p (1920x1080) Advanced Simple Profile Level 5 20 Mbps at 30 fps	3GPP (.3gp), MP4 (.mp4, .m4a), Matroska (.mkv), AVI (.avi, .xvid)
	H.264 1080p (1920x1080) High Profile level 4 20 Mbps at 30 fps	3GPP (.3gp), MP4 (.mp4, .m4a) Matroska (.mkv), MPEG2-TS (.ts, AAC audio)
	H.263 Profile 0 Level 70	3GPP (.3gp), MPEG-4 (.mp4, .m4a)
	VP8	WebM (.webm), Matroska (.mkv)

Video Recording	Encoder format	Supported in file format
	Video: H.263 Profile 0, H.264 1080p (1920x1080) High Profile  Audio: AAC-LC stereo, AMR-NB	3GPP (.3gp), MP4 (.mp4, .m4a)
Audio/Video Streaming	Streaming transport	RTSP, HTTP / HTTPS, HLS
DRM	DRM (Digital Rights Management) – features the rights and copy protection of downloaded content	OMA DRM 1.0 Marlin DRM

## Synchronisation (OMA DS, EAS, Google Sync™)

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OMA Data Synchronisation protocol versions 1.1.2 and 1.2

OMA Data Formats: vCard 2.1, vCalendar 1.0

Microsoft® Exchange ActiveSync® protocol version 2.5

Microsoft® Exchange ActiveSync® protocol version 12

Microsoft® Exchange ActiveSync® protocol version 12.1

Microsoft® Exchange ActiveSync® protocol version 14

Microsoft® Exchange ActiveSync® protocol version 14.1

Google Sync™

Related information:

[www.sonymobile.com/developer](http://www.sonymobile.com/developer)



## Web browser

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Google Chrome™ for Android™ is pre-installed.\*

Related information:

<https://play.google.com/store/apps/details?id=com.android.chrome>

\* Google Chrome™ is not available for all markets.

# Memory in Android™ devices

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To use Android devices efficiently, users should be aware of the different types of device memory. This knowledge is important in order to understand, for example, where music, photos and videos are saved; how many apps can be downloaded from Android Market; and how photos can be copied to a PC.

The below information is also of interest to developers who want to optimise their programs to make the best possible use of the resources in the device.

Generally, all Android devices share the same basic memory setup. What differs is how much memory is available to you via the different types of memory, and whether your device uses an external SD card or an internal memory chip. Any information specific to the particular device model described in this White Paper is noted as such.

## Types of memory

The types of memory described and numbered below are consistent with the terminology used in Sony mobile device menus and in other content relating to 2013 Xperia™ devices:

1. Dynamic Memory (also known as RAM) is used by applications that run when the device is turned on. The amount of Dynamic Memory influences how many applications and operating system services can run at the same time. The Android operating system automatically closes applications and services that are not being used.

However, such automatic functionality has limits. For example, if a lower amount of free RAM is available to applications after a new release of the operating system (due to increased capabilities in the system), device speed will eventually be impacted. This is the main reason that a device cannot be indefinitely upgraded to newer releases of Android™.

If you experience problems with RAM, for example, if the device runs slower than usual or if the Home application restarts frequently when you leave an application, you should minimise the use of apps that run all the time. Such apps could include, for example, applications that frequently download social networking service updates. You could also consider using a static wallpaper instead of a live wallpaper.

To see which apps and services are currently active, go to Settings > Applications > Running Services. You should have at least 50 MB, and ideally 100 MB or more, of free RAM to avoid slowdowns and application restarts.

You should also be aware that if you update the device to a later Android release, the load on the built-in Dynamic Memory will increase due to the addition of more features, as mentioned above. As a result, the device may run slower after an update.

The Xperia™ ZR has about 2 GB of RAM available to the Android OS and applications, of which about 200 MB is already used out of the box.

2. System Memory (also known as “System partition” or “/system”) is used for the Android OS and for most applications that are pre-loaded from the factory. This type of memory is normally locked, and can only be changed through a firmware upgrade. There is usually some free space available in this section of memory. However, since it is locked, you cannot save apps, photos or any other content to this memory. System Memory is reserved for future firmware upgrades, which almost always need more memory than the original firmware. You cannot see or influence the use of this memory.
3. Internal Storage is memory used as “working” memory. It can be compared to the C: drive on a PC or to the startup disk on a Mac.

This type of memory is used to store all application downloaded from the Google Play™ Store (and other sources) as well as their settings and data (such as emails, messages and calendar events, for example). All applications have an allocated area which no other applications can access and where the application data can be stored.

Some game applications also store content such as game music and game level information outside their own designated area. In most cases, an application can choose to save its data in a location of its own choosing (outside the protected application settings area). Generally, such content is not deleted when an application is uninstalled; it must be removed manually by connecting the device to a computer with a USB cable, or by using a file manager application.

Internal Storage is also used for all user content added, for example, as a result of the user taking photos with the camera, downloading media files, and performing file transfers. Typical user content includes:

- photos
- movies
- music
- downloaded documents (as email attachments, for example)

Internal Storage will tend to fill up as a result of normal usage. Examples of such usage are the saving of data by applications; the downloading and installation of new applications; the downloading of free or paid content; and the shooting of pictures and movies. Therefore, the larger this memory is from the start, the more applications you can download and use, and the more pictures and movies you can shoot.

If the Internal Storage starts to get full, the device slows down, and in some cases it might no longer be possible to install more apps. You should always ensure that you have at least 100 MB of free Internal Storage. If not, you should consider removing some apps that you seldom use, or move content that you do not frequently access to safe storage.

You can see approximately how much Internal Storage is free under Settings > Storage > Internal Storage. You can also view more detail about how much memory is used by various applications under Settings > Applications > Manage Applications. In the Xperia™ ZR, about 4.6 GB of Internal Storage is available out of the box.

Please note that in Sony Mobile 2013 products, “Internal Storage” is now the combination of what was previously known as “Device Memory” (for applications and their data – also previously known as “/data”) and “Internal Storage” (for user’s content – also previously known as “/sdcard”). The reason for this change is to make the use of available memory more flexible, and also to enable the optional encryption of user’s content.

#### Memory card slot

In some products you may find both a large internal memory and a memory card reader slot. However, on the current Android platform, the card reader slot does not work in the same manner in a device with a large internal memory as it does in a device with ONLY a memory card slot.

Generally, since most applications expect only a single location for storage, such applications will not generally allow you to SAVE anything to the memory card (i.e., they do not offer the option to choose a storage location). However, some applications (for instance, the Sony Mobile “Camera” application) may actually allow you to do so. Other applications, for example, backup applications such as the Sony Mobile “Memory” application, will by definition be configured to copy content from the Internal Storage to the external SD card.

On the other hand, when it comes to reading from an external SD Card, you will be able to access content (for example, videos, photos and music) on a memory card inserted in this slot without any special consideration since the Android system searches all available memory for content. Therefore, such products may be regarded as supporting a fourth type of memory, called “External Card” or “SD Card”.

4. SD Card (known as “/ext\_card” from a programmer’s point of view, or by other names in other Android products) is the name for the removable SD memory card in all 2013 Sony Mobile products. As described above, this External Card memory is generally more limited in that any application can read from it, but many applications cannot save to this card. Only a few applications, including backup applications and file manager applications, have the capability to save to this card.

#### Backing up data to different memory types

Generally, you should not save photos, videos and other personal content solely on the internal memory of a device. If something should happen with the hardware, or if the device is lost or stolen, the data stored on the device’s internal memory is gone forever.

In a device where an SD card reader is the main memory, it is relatively easy to take the card out and copy all content to a PC or Mac, or to an entertainment device with a memory card slot. In a product featuring Internal Storage as the main memory, it is not possible to physically remove the memory. Instead, any critical or high-value content must either be copied to an external SD card by a special backup application, transferred to remote storage over a network (mobile or Wi-Fi), or to a computer via a USB cable.

To facilitate the transfer of data via a cable, the Xperia™ ZR supports the Microsoft standard, Media Transfer Protocol (MTP), which makes it possible to easily transfer content back and forth between your device and a Windows PC. For Apple Mac computers, a special application called Bridge for Mac is available with built-in support for MTP. This application can be downloaded from the Xperia™ ZR Support page.

Note that you do not need to back up or make a copy of applications that you have downloaded from the Google Play™ Store. They can normally be downloaded again after you have set up your Google account to work in a new device (or in a device where the memory has been completely erased).

#### Note 1:

As noted above, some Android devices, including Sony Mobile devices from 2012 and Sony Ericsson devices from 2011 and earlier, do not use a single “Internal Storage” for both applications (and their data) and user content. Instead, these devices use either an external SD card for user content, or a corresponding area of internal memory to reproduce the functionality of an SD card. In such devices, there is a fixed limit between the application area (“/data”) and the user content area (“/sdcard”), with the result that user content can build up and reach this limit. The consequence of such a limit being reached, for example, for the camera application, would be that no new pictures could be taken even if there was still a considerable amount of free space in the application area (or in the user content area). In such an instance, the download and installation of new applications would also not be possible, even if there was enough free memory in the content area.

#### Note 2:

Some devices with integrated storage have abandoned the distinction between the application area and the content area when it comes to a Factory Data Reset. As a result, there is no option in such devices to perform a Factory Data Reset and preserve content. In such devices, all content is mandatorily and completely deleted from the device when a reset is performed.

In contrast, Sony Mobile’s memory integration solution makes it possible to preserve user content in this situation. Therefore, when performing a Factory Data Reset, the default action will still be to only remove applications and their data, and an option box must be checked if all content is to be removed as well (as might be desirable when selling the device second-hand, for instance).

**Note 3:**

For a developer, it is important to note that from a programming point of view the location names used to refer to the different memory areas described in Note 1 are still valid, i.e., the area used for applications (“/data”) is still present, as is the area used for content (“/sdcard”).

In reality, “sdcard” is a so-called “symbolic link” to “/data/media”. However, from inside an Android application, “/sdcard” can still be used. For example, you can use “sdcard/DCIM/100Android” to find all camera images. The continued use of “/sdcard” to access the content area ensures compatibility across different products and Android releases in this regard.

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